

**REMARKS**

Claims 1, 4, 5, 7, 9, 10, 12, 14, 15, 16, 17, 19, 21, 22, 23, 31 and 32, all the claims pending in the application, are rejected. Claims 5 and 9 are amended. Claims 1, 4, 7, 10, 12, 14, 16 and 31 are cancelled. New claims 33 and 34 are added.

New added claims 33 and 34 are based on the description of Examples 1 and 2.

***Claim Rejections - 35 USC § 102***

**Claims 1, 4, 5, 7, 9, 10, 12, 14, 16, 17, 19, 21, 23, 31, and 32, are rejected under 35 U.S.C. 102(e) as being anticipated by Nozawa (US 2002/0058186).** This rejection is traversed for at least the following reasons.

First, as to claims 1, 4, 7, 10, 12, 14, 16 and 31, the rejection is moot in view of the cancellation of these claims.

Second, in framing the rejection, the Examiner repeats the text from the previous rejections of claims 1 and 2.

Third, in the Examiner's Response to Arguments at page 5 of the Office Action, the Examiner provides certain suggestions for patentability, which are adopted by Applicants, but still minimizes consideration of Applicants' previous arguments and distorts the teachings of the prior art. With the following corrections and comments, Applicants submit that a fair consideration of the invention as now claimed and the limited teachings of the prior art will lead to a conclusion that the remaining claims are patentable.

**Arguments As To Limited Teachings of Nozawa**

Applicants respectfully submit that the Examiner has not fully considered, as evidenced by a complete silence with respect to the issue, (1) Applicants' argument that Nozawa has no description or suggestion with regard to the existence of *ammonium ions*, (2) the problem

caused by the production of the *ammonium ions* and (3) the solution to that problem discovered by the inventor. In the event that the Examiner persists in this rejection, a clear and detailed statement of a scientific rationale for the rejection is requested so that the technical facts can be adequately addressed by the Applicants.

Statement of Oxygen Atmosphere

The Examiner has pointed out in the Response to Arguments that "Second, it is not stated in the claims in question to not have an oxygen atmosphere, or any oxygen at all."

Applicants view this as an invitation to add an appropriate limitation about "oxygen" into claims 5 and 9, which would provide a basis for allowance of the claims. Such amendment has been made.

Statement of Omitting Oxygen in Nozawa

The Examiner states in the Response to Arguments that "Third, stating that is desirable not to include a reactive oxygen atmosphere is not stating to omit the use of oxygen".

Applicants respectfully submit that, even though Nozawa does not definitively exclude an oxygen atmosphere, the complete focus and characteristic point of Nozawa is the use of a thermal treatment which does not provide any change to the film composition. Thus, even if oxygen is present, because of this focus, oxygen would have minimal effect since the film composition is not to be changed by anything, including the presence of oxygen.

Misreading of Nozawa Teachings

The Examiner also states in the Response to Arguments that "Furthermore, it can clearly be seen in paragraph 0022 that oxygen is present in the light translucent film,".

However, Applicants respectfully submit that paragraph 0022 merely describes that the main composition of the light translucent film are oxygen and/or nitrogen, and silicon. The text states as follows:

[0022] Another aspect of the invention is a method for manufacturing a half tone type phase shift mask blank having a translucent film on a transparent substrate, wherein thermal treatment of the translucent film is implemented at more than 380.degree. C. after forming the translucent film including at least one layer of thin film including oxygen and/or nitrogen, and silicon on said transparent substrate.

The foregoing text merely means that oxygen is present. It does NOT mean that the light translucent film including oxygen was formed as a result of and after the thermal treatment.

Further, according to the present invention, when the thermal treatment is carried out on the light translucent film, the film composition that is changed is not simply on the surface but is achieved deeper, in the direction of the film thickness.

#### Differences in Art for Nozawa and Oshima are Not Considered

The Examiner has pointed out that "Therefore, it is shown that the limitation taught in Oshima in combination with Nozawa teaches all limitations of the invention." (page 6 of Final Office Action).

However, as detailed subsequently, Oshima relates to the negative photosensitive lithographic printing plate. The technique for the printing plate is substantively and significantly different from that for the photomask of the present invention.

#### Claims 5 and 9

Independent claims 5 and 9, as amended, now contain three key limitations. First, they already recite that the claimed halftone phase shift mask blank contains an ammonium ion

production preventing layer that prevents production of *ammonium ions*. Second, these two claims now have been amended to expressly recite that the ammonium ion production preventing layer is formed “with an *oxidation* of a surface portion of said light-semitransmissive film.” Third, the two claims expressly require formation of the film so as to contain a metal, silicon, nitrogen and oxygen.

### **The Invention**

The present inventor discovered that, if the light-semitransmissive film (light translucent film) contains nitrogen, *ammonium ions* are produced by a reaction between the nitrogen contained in the film and H<sub>2</sub>O or the like in the atmosphere. The present inventor also discovered that the presence of ammonium ions presents a problem in achieving desired performance.

### **Prevention of Ammonium Ions**

According to the present invention, based on such discoveries, an ammonium ion production preventing layer is formed on or at the surface portion of the light-semitransmissive film (light translucent film). The film includes nitrogen. Oxygen is placed in the light-semitransmissive film, to thereby reduce the content of nitrogen, so that the production of *ammonium ions* can be prevented.

The prior art, which is taken from Applicants own research, did not recognize either the problem or the solution, and does not teach one skilled in the art enough to achieve the invention as claimed.

### **Nozawa**

Nozawa discloses a method for manufacturing a phase shift mask blank comprising a light translucent film having a film characteristic that is superior in chemical resistance, internal

stress, and the like, by carrying out a thermal treatment of the light translucent film at more than 150 °C after forming the light translucent film comprising nitrogen, metal, and silicon as main component on the transparent substrate (see ABSTRACT).

Nozawa is Missing Claim Limitations For *Ammonium Ions*

However, Nozawa neither discloses nor suggests the following key points.

(a) Prevent the production of *ammonium ions*.

(b) Form an *ammonium ion* production preventing layer by oxidation of the surface portion of the light-semitransmissive film so as to (1) contain metal, silicon, nitrogen and oxygen and (2) be less in nitrogen content relative to the light-semitransmissive film other than the surface portion.

In asserting that the light translucent film in Nozawa necessarily has an ammonium ion production preventing layer, the Examiner at page 2 of the Office Action points to the abstract and the text at paragraphs 0050 and 0075. However, the Abstract does not mention *ammonium ions* and merely states that the film comprises “nitrogen, metal and silicon as a main component” and offers superior chemical resistance, light resistance and internal stress. Further, Nozawa at paragraph 0050 does not mention *ammonium ion* production and merely states two functions that do NOT include *ammonium ion* production:

[0050] The light translucent portion has two functions: a shielding function actually shield exposed light and a phase shift function shifting phase of light.

Finally, at paragraph 0075, Nozawa merely states:

[0075] The invention includes, for example, a light translucent film of multi layer structure laminating two or more layers of a low transmittance layer and a high transmittance layer other than the light translucent film of single layer comprising

nitrogen, metal, and silicon as a main component and not including oxygen as in the first aspect and the light translucent film of single layer including oxygen and/or nitrogen, and silicon as in the second aspect.

The reference in the foregoing text to oxygen content relates to the transmittance layer content, as explained in subsequent paragraphs 0076-0077, and nothing in this text teaches or suggests a content of the translucent film used for *ammonium ion* prevention.

In short, the Examiner has taken text from Nozawa out of context and misinterprets that text to create a teaching based solely on what Applicants have newly taught in the present application and now claimed in claims 5 and 9.

Focus of Nozawa's Thermal Treatment is on *Chemical Resistance* for *Washing the Mask*

Nozawa's thermal treatment is focused on reducing the film stress and improving the chemical resistance and the light resistance of the film. The chemical resistance in Nozawa does not concern a resistance to *ammonium ions*. The chemical resistance of concern to Nozawa relates to the washing liquid of the mask, as is clear from the teachings in paragraph 0017 of the reference. The light resistance of concern to Nozawa involves the change in transmittance or the like caused by laser light while using the mask for a long period of time. Although Nozawa does not provide details with respect to the light resistance, it is well known in the art and clearly does not concern ammonium ions.

By contrast, the heat treatment (thermal treatment) in the present invention is for preventing production of the *ammonium ions* in order to reduce the ammonium sulfate etc. which deposits by laser irradiation. The claimed heat treatment and its express result is substantively different from the thermal treatment in Nozawa.

Nozawa Avoids a Change in Film Composition

Further, although Nozawa's thermal treatment may not fully exclude an atmosphere containing oxygen, the thermal treatment is focused on realizing a reduction of the film stress and the like. There is NO change to film composition. This conclusion, which would be reached by one skilled in the art, is supported by the description in Nozawa (1) that it is desirable not to include a reactive atmosphere such as oxygen because the composition of the direction of film thickness changes by including the reactive atmosphere (see paragraph 0035) and (2) that it is desirable to prevent oxidation of the surface of the light translucent film because inert gas, such as nitrogen, is introduced (see paragraph 0108).

By contrast, in the heat treatment of the present invention, oxygen is included in the surface of the light semi-transmissive film by positively oxidizing the surface of the light semi-transmissive film and the film *composition is changed* in the *direction of the film thickness* so as to reduce the content of nitrogen. Such a heat treatment is quite different from the thermal treatment of Nozawa.

**Claims 17, 19, 21 and 23**

These claims would be patentable because of their dependence from patentable claims 5 or 9.

**Claim 32**

In the Amendment filed on June 27, 2008, Applicants filed new claim 32, which defines the light semitransmissive layer as having molybdenum and defines the ammonium ion production preventing layer as being formed on the light semitransmissive film and containing less nitrogen content relative to the light semitransmissive film.

To the extent that the claim limitations are similar, this claim would be patentable for reasons given for claims 5 and 9.

***Claim Rejections - 35 USC § 103***

**Claims 15 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nozawa (US 2002/0058186) as applied to claims 1, 4, 5, 7, 9, 10, 12, 14,16, 17, 19, 21, 23, 31, and 32 above, and further in view of Ohshima (2002/0142249).**

First, as to claim 15, the rejection is moot in view of the cancellation of the claim.

Second, with regard to claim 22, Applicants have demonstrated that parent claim 5 is patentable over Nozawa. Further, the Examiner admits that Nozawa is silent on the concentration of **ammonium**. The Examiner looks to Oshima for such teaching.

**Oshima**

The Examiner states that “Ohshima teaches the concentration of ammonium ion is from 0 to 10,000 ppm, which is less than 20 nanograms per centimeter squared (see page 25, paragraph 0219).” The Examiner finds this a basis for establishing in Nozawa a concentration of ammonium ion to be less than 20 nanograms per centimeter squared. The motivation is “to accommodate anodization treatment of a lithographic printing plate.”

**Nozawa and Oshima are Not Analogous Art**

The Examiner asserts that Oshima and Nozawa are analogous art. However, the Examiner must understand that the environment, techniques and process parameters for the manufacture of a printing plate in Oshima is dramatically different from that for the photomask of the present invention.

In Oshima, the goal is the production of a negative photosensitive lithographic printing plate comprising a support and a photosensitive layer which can generate the active species such as radicals. The manufacture of the plate requires a technique that is concerned with the composition of the photosensitive layer in order to have sufficient press life without impairing



developability (see ABSTRACT and paragraph 0002).

The anodization treatment in Oshima, which is relied upon by the Examiner, is the treatment conducted on the aluminum substrate support in order to improve the corrosion prevention and the abrasion resistance. This anodization treatment is performed by immersing the aluminum substrate into electrolysis solutions, such as sulfuric acid. Oshima merely discloses the point that the ammonium ion of 0 to 10,000 ppm may be contained in the electrolysis solutions used in the anodization treatment. The Examiner's reference to page 25, paragraph 0219, reveals either a critical misunderstanding or an error in reference.

At any rate, the present invention pays attention to the concentration of the ammonium ion generated with the nitrogen in the light semi-transmissive film and is unrelated to the concentration of the ammonium ion in the electrolysis solutions. For the reason, the technique in the present invention is quite different from that of Oshima.

In short, one skilled in the art would not obtain the necessary teachings from compatible processes in Nozawa and Oshima to render the claimed invention obvious.

### ***New Claims***

New claims 33 and 34, which depend from independent claim 32 and further specify the size and composition of the ammonium ion prevention layer, would be patentable because of that dependency and in their own right due to the absence of relevant teachings in the prior art.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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Respectfully submitted,

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